DOCUMENT RESUME

ED 082 924 RC 007 398

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TITLE Exploring Small Climates--An Outdoor Science Technique.
PUB DATE 70
NOTE 6p.

EDRS PRICE MF-$0.65 HC-$3.29
DESCRIPTORS *Climatic Factors; *Curriculum Enrichment; Elementary Grades; Learning Activities; *Outdoor Education; *Science Activities; *Teaching Techniques; Temperature

ABSTRACT

The study of climates in small areas as an outdoor science teaching technique is described in this paper. It is suggested that, while teachers are presenting a weather unit to their elementary school classes, they should not overlook the opportunity to make learning more meaningful through outdoor teaching techniques. Explorations of temperatures in different places may indicate that factors affecting weather, such as temperature, humidity, sun radiation, wind and air movement, conductivity, shape of the land surface, and precipitation may vary as much for the little climates as they do for a general region. Various methods of observing the weather are suggested. A lesson plan for the study of small climates provides the following: objectives, concepts, vocabulary, materials, instructional procedure and activities, and evaluation. (PS)

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EXPLORING SMALL CLIMATES - AN OUTDOOR SCIENCE TECHNIQUE

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What is the weather going to be like today? This is a question that nearly everybody thinks of as they get out of bed in the morning. Most of us just pick up the morning newspaper or switch on the radio and find out not only today's weather, but probably tomorrow's and perhaps even for the day after. Predicting tomorrow's weather and the weather for several days in advance is no easy job. To do it accurately, the weatherman needs lots of instruments and charts and many years of training. However, understanding the weather is easier to do.

Helping students to develop basic concepts about our weather is one of the responsibilities of most elementary school teachers. Many teachers have developed a unit of study on weather and its importance to man. Most all elementary science textbooks include a study of weather and how man can prepare for temperature changes Weather is a topic that is close to the life of every child. Because they spend so much time exploring and playing out-of-doors, they are vitally interested in what the general weather for the day is going to be. Teachers should capitalize on this motivating factor and a unit on weather can be a vitalizing and enriching component of the elementary science curriculum. While teachers are presenting such a unit to their class, they should not overlook the opportunity to make learning more meaningful through the employment of outdoor teaching techniques. Exploring small climates outdoors is such a technique.

From their textbooks students have learned that climate refers to the weather conditions of an extensive area over an extended period of time. A definition generally accepted is that climate is "all weather of a region." Usually textbooks deal with all the weather of a large area of the country and do not include the kinds of weather in a variety of little areas. The weather isn't the same everywhere at the same time. It may be cool on the water and very hot on the land surface. A winter day may be comfortable in the sun and very cold in the shade. Small climates are sometimes referred to as microclimates by scientists. They have further defined small climates as that layer of air near the ground in a specific area.

A daily weather map of the United States will indicate a variety of temperature ranges from one part of the country to another. A coastal community in the state of Maine will have temperatures quite different from a community in the western state of Wyoming. The community in Maine might have an average winter temperature of 30 degrees, slightly below freezing. The community in Wyoming might have an average winter temperature of ten degrees. The difference of 20 degrees will influence how one dresses and the types of outdoor activities one will participate in. The winter conditions might be the same in both communities. The sun may be shining in both communities on a given day but proximity to a large body of water may warm the Maine community in the winter and cool it in the summer, while the opposite may be true for the western community which may not be near a large body of water. Such temperature extremes may even occur on a given day within a community.

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It is important for us as human beings who have the ability of movement to know what kind of weather is to be expected and how to prepare for it. To a small pine tree growing on the north side of an exposed hill, the important consideration is that the conditions of its environment remain adequate for normal growth. Climate for a pine tree refers only to the area in which it lives. The size of an area is important to a specific living thing. This area is larger for living things that have mobility and smaller for those that are stationary.

In the outdoor laboratory, just beyond the four walls of the classroom, are found many small climates which will provide opportunities for elementary school children to learn firsthand that although the temperature for their general area was announced in the newspaper, on radio or television, there are many temperature variations within their own community. Explorations of temperatures in different places may indicate that factors affecting weather, such as, temperature, humidity, radiation by the sun, wind and air movement, conductivity, shape of the land surface and precipitation may be as great in variation for the little climates as they are for a general region. Primary school children might learn that although there are many different words used to describe weather, only three, namely, heat, air and water are the important great weather-makers.

There are many places right on the schoolgrounds where small climates may be explored. There are places where the sunlight never strikes and places where the sunlight strikes all day. Each factor affecting the variation of one small climate from another will present many opportunities for the development of basic concepts. For example, heat pile up as an affecting factor can be explored by taking the temperature near various surfaces. A black asphalt playground might differ in surface temperature from a concrete sidewalk on a sunny day. The students can explore temperatures on two opposite sides of a slope and experience directly how land form affects small climates. Conductivity of heat and cold might be explored through the examination of wooden materials, stone and metal materials found in the out-of-doors.

Inexpensive thermometers can be utilized effectively for exploring temperatures in different places. Every student should have the direct experience of using a thermometer and, consequently, there should be enough to guarantee this objective. In order to reduce the incidence of breakage, each thermometer should be mounted on a stable flat surface, such as wood or cardboard. A string should be tied to each thermometer in order to facilitiate getting to those out-of-the-way temperatures. A string attached to a thermometer would make it possible to explore the small climate of a woodchuck hole, a drainpipe, a hollow tree, over a pond, stream or a spring.

Relationships in the out-of-doors are greatly enhanced as youngsters become aware of the interrelatedness of insect, mammalian, reptilian and human life to climatic conditions. For example, one will seldom find certain insects, such as the mosquito, in the bright sunlight or dry places. Mosquitos could be located and the temperature taken at the place where they flourish. The temperature could be reported as insects, such as ants, begin their spring activity. Monitoring insect, mammalian and reptilian activity can be enhanced by recording the temperatu when they are first observed and last observed.

Another concept which might be developed is that although both man and animal cannot change the climate of a large area, they can certainly affect the

microclimate. Man, for example, can place a plant in a cold frame where it might have more favorable conditions for growth than it would have if left to grow in the open. Through the utilization of glass or clear plastic, school children could experiment with controlled small climates. In the bird kingdom, the downy woodpecker changes the climate by building a hole in a tree and fluffing his feathers out to raise the temperature during cold winter nights. When a ground-hog digs a hole in which he can retire when the weather is severe or when a man puts on warm clothes before going out into the cold, both are creating a smaller climate.

A group of elementary school children could watch the hilltops, the gullies or ditches, and the sheltered places near the school in early spring and observe the snow that remains in some places weeks after it has melted elsewhere. A class could keep a record at the front of the school, the back of the school, and the two sides, which will show differences in the length of time it takes for each location to be free of snow. After a few days of sunlight following a snow, some small trees and shrubs on the school grounds may not have snow at their base. A thermometer would be useful in determining if the temperature near the bush or shrub varies from the temperature in the open area.

If the youngsters in the class are able to handle and read a magnetic compass, then they could determine which side of the school building was coldest and which side was hottest in terms of north, south, east and west. Inquiry into and discussion about why the temperature varies on a specific side in relationship to the other sides will stimulate the development of new concepts. Temperatures could be taken at different times of the day to determine the positions of the sun and its effect on temperature.

In addition to exploring the temperature variations in different spots of the surface of the ground, youngsters could explore what the temperatures are at various levels underground or under snow.

Some of the places small climates could be explored on the school site might be: Under shrubs and bushes, on a paved playground, on barren soil, over and under snow, on a lawn, near the base of the school building, on the sheltered side of the school building, under a deciduous tree, under a coniferous tree, inside a cocoon, inside of an animal home, such as a burrow or lodge, on top of a hill or slope, near the bottom of a hill or slope, down a storm sewer, a drainpipe, over a burning incinerator, and many other possible locations.

Because small climates can be found easily in the natural world, teachers should take the opportunity to provide situations in which youngsters will have direct experiences exploring small climates beyond the four walls of the school. This means going into the out-of-doors for as long a period of time as is necessary for concepts to be developed based on real experiences by all of the youngsters. Teachers in elementary schools across the nation are providing situations in the school curriculum for youngsters to develop attitudes, skills and concepts about the weather. Knowing how to dress properly to be free from colds and other diseases associated with exposure is part of understanding small climates. Understanding the function of little climates in our everyday lives is another. Exploring small

climates is an outdoor teaching technique which can be effectively utilized by many teachers.

The following lesson plan is only suggestive as a means of implementing a study of small climates:

Topic: Temperatures in Different Places

Objectives:

1. To develop an awareness that the temperature varies in different places.
2. To develop skill in using a thermometer.
3. To discover the reasons for differences in temperature in different places.

Concepts:

1. Weather isn't the same everywhere at the same time.
2. Darkness and lightness make a difference in the way things heat up.
3. Temperatures are different in different places.
4. Heat, air and water are the basic weather-makers.
5. A thermometer is an instrument used to measure temperature.
6. Humidity, radiation, wind and air drainage, conductivity, shape of surface can cause a difference in temperature.

Vocabulary:

thermometer	macroclimate	conductivity
temperature	absorption	microclimate
humidity	degrees	reflection
climate	radiation	

Materials:

Thermometers (calibrated)
Simple thermometers taped to flat stick with string attached.
Data sheet for recording temperatures
Magnetic compasses
Pieces of white and black cloth (12" x 12")
Clip boards (cardboard with paper fastener clip)
Pencils
Weather vanes (classroom-made)
Protractor attached to yardstick for slope angle determination.

Instructional Procedure and Activities:

1. Have each child make his outdoor thermometer by attaching inexpensive thermometer to flat stick (attach string to it).

2. Each child prepares his own clipboard by attaching a clip to a piece of cardboard (8½" x 11").

3. Each child prepares a small climate data sheet. (Includes station number, description of location, temperature reading, compass reading, angle of slope, direction of wind, relative humidity, signs of animal activity, etc.)

4. Have the children explore various places on the school grounds for temperature readings and other information required by data sheet, such as near a tree, against the side of the school building, down a sewer hole, over a tree limb, on a concrete sidewalk, on the asphalt playground, etc.

5. Take temperature of various car surfaces and note which color car is the warmest and the coolest. Repeat same procedure for inside of cars. A hand test would be good for primary level. Just feel which car is hottest and which is coolest.

6. If there is snow, place black and white pieces of cloth on snow and observe which sinks into the snow fastest. Take temperature readings on each piece of cloth.

7. Map a small climate map of school grounds listing data for each station.

Evaluation:

1. Do you find that temperatures were different in different places?

2. Where did you find the warmest temperature. . . . the coolest temperature?

3. What material did you find to be the warmest and which was the coolest?

4. Did the wind have any effect on the temperature? Was the temperature reading higher or lower where the station was protected from the wind?

5. What are some of the reasons for the differences in temperature readings?

As mentioned earlier, the above lesson plan is only suggestive and any modification or refinement needed to meet specific objects is certainly permissive. A better understanding of small climates and the relationship of life forms to them will be more effectively assimilated by the school youngsters when they take to the outdoor laboratory with monitoring equipment in tow.

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